Antarctic Meteorite NEWSLETTER

A periodical issued by the Antarctic Meteorite Working Group to inform scientists of the basic characteristics of specimens recovered in the Antarctic.

Volume 9, Number 3 August, 1986

Supported by the National Science Foundation, Division of Polar Programs, and compiled at Code SN2, Johnson Space Center, NASA, Houston, Texas 77058

!!!!!!!! SAMPLE REQUEST DEADLINE: OCTOBER 20, 1986 (SEE PAGE 2) !!!!!!!!

PAGE

SAMPLE-REQUEST GUIDELINES

All sample requests should be made in writing to

Secretary, MWG
SN2/Planetary Materials Branch
NASA/Johnson Space Center
Houston, TX 77058 USA.

Questions pertaining to sample requests can be directed in writing to the above address or can be directed by telephone to (713) 483-3274.

Requests for samples are welcomed from research scientists of all countries, regardless of their current state of funding for meteorite studies. All sample requests will be reviewed by the Meteorite Working Group (MWG), a peer-review committee that guides the collection, curation, allocation, and distribution of the U. S. Antarctic meteorites. Issuance of samples does not imply a commitment by any agency to fund the proposed research. Requests for financial support must be submitted separately to the appropriate funding agencies. As a matter of policy, U. S. Antarctic meteorites are the property of the National Science Foundation and all allocations are subject to recall.

Each request should refer to meteorite samples by their respective identification numbers and should provide detailed scientific justification for the proposed research. Specific requirements for samples, such as sizes or weights, particular locations (if applicable) within individual specimens, or special handling or shipping procedures should be explained in each request. All necessary information should probably be condensable into a one- or two-page letter, although informative attachments (reprints of publications that explain rationale, flow diagrams for analyses, etc.) are welcome.

Requests that are received by the MWG Secretary before October 20, 1986 will be reviewed at the MWG meeting of October 23-25, 1986 to be held in Washington, DC. Requests that are received after the October 20 deadline may possibly be delayed for review until the MWG meets again in the spring of 1987. PLEASE SUBMIT YOUR REQUESTS ON TIME.

Samples can be requested from any meteorite that has been made available through anouncement in any issue of the *Antarctic Meteorite Newsletter* (beginning with 1(1) in June, 1978). Many of the meteorites have also been described in the following catalogs:

Marvin, U. B. and B. Mason (eds.) (1984) Field and Laboratory Investigations of Meteorites from Victoria Land, Antarctica, *Smithsonian Contr. Earth Sci. No. 26*, Smithsonian Institution Press, 134 pp.

Marvin, U. B. and B. Mason (eds.) (1982) Catalog of Meteorites from Victoria Land, Antarctica, 1978-1980, *Smithsonian Contr. Earth Sci. No. 24*, Smithsonian Institution Press, 97 pp.

Marvin, U. B. and B. Mason (eds.) (1980) Catalog of Antarctic Meteorites, 1977-1978, *Smithsonian Contr. Earth Sci. No. 23*, Smithsonian Institution Press, 50 pp.

EDITOR'S OVERVIEW

James L. Gooding

AN UNUSUALLY LARGE CHONDRITE

Because of its size, Antarctic meteorite specimen, LEW85320 (H5 chondrite; p. 22-23), offers an opportunity for studies of meteorite properties that might vary with depth in a large specimen. In particular, an obvious possible use of this specimen is documented sampling as a function of depth for studies of cosmogenic nuclides. Curation and processing of LEW85320 at JSC has been deliberately limited to drying and storage under dynamic flow of high-purity nitrogen gas, with only conservative sampling. Except for removal of surficial salt (and soil?) samples and extraction of a single small chip for classification work, the specimen has been maintained intact.

It has been suggested that LEW85320 should be used as a museum display specimen. Alternatively, it has been suggested that the specimen be systematically dissected in support of various scientific studies. Researchers interested in LEW85320 should formulate their suggestions and plans for use of this specimen and submit them in writing to the Secretary/Meteorite Working Group at the address given on page 2. Remember that letters must be received by October 20, 1986 in order to be assured of review by MWG at the October 23-25, 1986 meeting.

DON'T FORGET TO READ ISSUES 9(2) AND 9(4) !

Issue 9(2) was published in June 1986 and contained descriptions of several newly classified meteorite specimens that should be of great interest to researchers. Before finalizing plans for sample requests, readers should remember to review the contents of issue 9(2).

Issue 9(4) (September 1986), which was co-mailed with the current issue, consists of a comprehensive listing of all specimens from the U. S. Antarctic meteorite collections that have been classified to date. The first version of that compilation was published in issue 8(2) (August 1985). The comprehensive listing in issue 9(4) is intended to be a stand-alone reference document that will serve as a quick guide to basic physical and classification data for the collections. We intend to update and distribute the list periodically as a separate issue of the Antarctic Meteorite Newsletter.

NEW METEORITES FROM 1983-1985 COLLECTIONS

Pages 6-23 contain preliminary descriptions and classifications of meteorites that were completed since publication of issue 9(2) (June 1986). Most large (> 150-g) specimens (regardless of petrologic type) and all "pebble"- sized (< 150-g) specimens of special petrologic type (carbonaceous chondrite, unequilibrated ordinary chondrite, achondrite, etc.) are represented by separate descriptions. However, some specimens of non-special petrologic type (i.e., equilibrated ordinary chondrite) are listed only as single-line entries in Table 1. For convenience, new specimens are also recast by petrologic type in Table 2.

Each "macroscopic" description summarizes features that were visible to the eye (with, at most, the aid of a binocular stereomicroscope) at the time the meteorite was first examined. Macroscopic descriptions of stony meteorites were performed at NASA/JSC. Each "thin section" description represents features that were found in a survey-level examination of a polished section that was prepared from a small (usually exterior) chip of the meteorite. Classification is based on microscopic petrography and reconnaissance-level electron-probe microanalyses. For each stony meteorite, the sample number assigned to the preliminary examination section (...,1 or ...,3, etc.) is included as an aid to workers who may later wish to intercompare samples from different locations in the meteorite. Exceptions to that rule occur for descriptions of several specimens that are thought to be members of a single fall. In those cases, a single microscopic description was based on several different thin sections.

Meteorite descriptions contained in this issue were contributed by the following individuals:

Mrs. Carol Schwarz, Ms. Roberta Score, and Mr. Rene' Martinez
Planetary Materials Laboratory
(NASA/Johnson Space Center)
Northrop Services, Inc.
Houston, Texas

Dr. Brian H. Mason
Department of Mineral Sciences
U. S. National Museum of Natural History
Smithsonian Institution
Washington, DC

Dr. James L. Gooding
Planetary Materials Branch
NASA/Johnson Space Center
Houston, Texas.

TENTATIVE PAIRINGS FOR NEW SPECIMENS

Table 3 summarizes possible pairings of new specimens with each other and with previously classified specimens, based on descriptive data provided in this newsletter issue. Readers who desire a more comprehensive review of meteorite pairings in the U. S. Antarctic collection should refer to the compilation provided by Dr. E. R. D. Scott, as published in issue 9(2) (June 1986).

METEORITE POWDERS PREPARED BY EUGENE JAROSEWICH

It is well known that, because many meteorites are compositionally heterogeneous at the millimeter to centimeter scale, representative sampling can be a significant problem in studies of the bulk compositions of meteorites. Especially for chemical and elemental measurements, it is advantageous to have all analyses performed on equivalent splits from a representative, homogenized powder so that meaningful intercomparison of data can be achieved.

Thanks to the generous cooperation and hard work of Eugene Jarosewich (Department of Mineral Sciences, U. S. National Museum of Natural History, Smithsonian Institution, Washington, DC), homogeneous-powder samples are available for many of the more interesting specimens from the U. S. Antarctic collection. A complete list of those powders is given in Table 4. For each specimen, the weight of the sample that was committed to homogenization is listed. The amount of material that remains from each sample varies from one specimen to the next because some material has been consumed in analyses by various investigators. However, these powders probably comprise the most representative bulk samples of the respective meteorites that can be obtained, especially for analyses that require only a few tens to a few hundreds of milligrams of material.

For each meteorite that contained a significant amount of metal, quantitative separations were made to produce metal and silicate (+ sulfide) portions by crushing and sieving. Large grains of metal were concentrated into the ">100-mesh" fraction. The "<100-mesh" fraction was predominantly silicate (+ sulfide and minor metal) material. For each meteorite that did not contain appreciable metal, though, no such splitting was attempted (e.g., eucrites, C2 chondrites).

Further details of sample preparation can be obtained directly from Eugene Jarosewich (details are provided along with allocated samples). However, requests for samples should be made through the Secretary/MWG at the address given on page 2 of this newsletter.

Table 1.

List of Newly Classified Antarctic Meteorites **

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
ALH 83046	32.9	H-5 CHONDRITE	A/B	A	17	15
ALH 83047	20.0	H-5 CHONDRITE	B/C	A	19	16
ALH 83048	2.3	L-5 CHONDRITE	B/C	A	24	20
ALH 83049	6.1	H-5 CHONDRITE	B	B	18	16
ALH 83050	9.7	H-6 CHONDRITE	A/B	B	17	15
ALH 83051	16.5	H-5 CHONDRITE	A/B	A	17	15
ALH 83052	52.8	L-6 CHONDRITE	C	B	23	20
ALH 83053	63.2	H-5 CHONDRITE	C	C	17	15
EET 83363	184.7	L-6 CHONDRITE	B	A/B	24	20
EET 83364	204.9	L-6 CHONDRITE	A/B	A	24	20
ALH 84073	630.6	H-5 CHONDRITE	B	A	17	15
ALH 84074	757.5	H-5 CHONDRITE	A/B	B	17	15
ALH 84075	788.6	H-5 CHONDRITE	C	B/C	17	15
ALH 84076	368.7	H-5 CHONDRITE	B/C	A	18	16
ALH 84077	276.4	H-5 CHONDRITE	B	A	18	16
ALH 84078	283.3	H-5 CHONDRITE	B/C	A	18	16
ALH 84079	749.6	L-6 CHONDRITE	A/B	A	23	20
ALH 84080	286.8	L-6 CHONDRITE	B	A	24	20
ALH 84081	612.3	LL-6 CHONDRITE	A	B	29	23
ALH 84082	556.6	H-6 CHONDRITE	C	A	19	17
ALH 84083	419.7	H-6 CHONDRITE	B/C	B/C	18	16
ALH 84084	331.8	H-4 CHONDRITE	B	A	18	16
ALH 84085	554.2	H-5 CHONDRITE	B/C	B/C	17	15
ALH 84086	234.0	LL-3 CHONDRITE	A/B	A	25-29	17-26
ALH 84087	314.6	L-6 CHONDRITE	A/B	A	24	20
ALH 84088	297.5	H-5 CHONDRITE	B	A	18	16
ALH 84089	303.8	H-5 CHONDRITE	B/C	A	18	16
ALH 84090	201.8	L-6 CHONDRITE	C	A	25	22
ALH 84091	214.6	H-5 CHONDRITE	B/C	A	19	17
ALH 84092	213.9	L-6 CHONDRITE	A/B	B	23	20
ALH 84093	113.5	H-6 CHONDRITE	B	B	17	15
ALH 84094	207.6	H-5 CHONDRITE	C	B	17	15
ALH 84095	276.8	L-6 CHONDRITE	A/B	A	24	20
ALH 84096	293.6	CARBONACEOUS C4	A/B	A	30	22
ALH 84097	388.7	L-6 CHONDRITE	B	A	24	21
ALH 84098	260.5	H-5 CHONDRITE	B/C	A	17	15
ALH 84099	150.3	H-5 CHONDRITE	B/C	B	17	15
ALH 84100	110.3	H-5 CHONDRITE	B	A	18	16
ALH 84107	134.1	LL-6 CHONDRITE	A	B	29	23
ALH 84111	131.5	H-5 CHONDRITE	B	A/B	18	16
ALH 84116	56.2	LL-6 CHONDRITE	B	A	28	23
ALH 84117	71.8	H-5 CHONDRITE	B	A	18	16
ALH 84119	33.8	LL-6 CHONDRITE	A	A	28	23
ALH 84126	41.2	LL-3 CHONDRITE	B	B	7-31	3-24
ALH 84131	107.9	H-5 CHONDRITE	C	B/C	18	15

Table 1. (cont.)

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
ALH 84135	31.3	H-5 CHONDRITE	B/C	A	18	16
ALH 84136	83.5	UREILITE	B	A/B	0-5	4
ALH 84137	145.4	H-5 CHONDRITE	B/C	C	18	16
ALH 84138	20.2	H-5 CHONDRITE	B	A	19	17
ALH 84139	157.1	H-5 CHONDRITE	A	A	19	17
ALH 84147	54.2	H-6 CHONDRITE	C	A	17	15
ALH 84151	112.4	H-6 CHONDRITE	B	A	18	15
ALH 84153	242.9	H-6 CHONDRITE	B/C	A	17	15
ALH 84157	88.6	H-5 CHONDRITE	B/C	A	17	15
ALH 84167	150.7	H-5 CHONDRITE	C	B	17	15
ALH 84168	14.2	LL-6 CHONDRITE	B	A	30	24
ALH 84170	39.2	E-3 CHONDRITE	B	A	0.6-28	0.9-17
ALH 84177	7.3	L-5 CHONDRITE	B	B	24	20
ALH 84178	0.4	H-5 CHONDRITE	B	A	18	16
ALH 84184	42.1	H-5 CHONDRITE	B	B	18	16
ALH 84185	4.8	H-5 CHONDRITE	C	A	18	16
ALH 84188	3.1	E-4 CHONDRITE	C	B		0.7-3
ALH 84191	14.0	CARBONACEOUS C2	A	B	0.4-.8	0.8-7
ALH 84198	5.4	LL-6 CHONDRITE	A/B	A	29	24
ALH 84206	15.1	E-4 CHONDRITE	A/B	A		0.7-6
ALH 84216	5.5	H-5 CHONDRITE	B/C	A/B	18	16
ALH 84227	12.1	H-5 CHONDRITE	C	B/C	18	16
ALH 84230	2.4	H-4 CHONDRITE	B	A	18	14-19
ALH 84236	32.3	H-5 CHONDRITE	B	B	18	16
ALH 84245	18.9	H-5 CHONDRITE	B	A	17	15
ALH 84250	10.0	E-4 CHONDRITE	B	A		0.5-4
ALH 84252	3.1	H-6 CHONDRITE	B/C	A	18	16
ALH 84254	2.0	E-4 CHONDRITE	B	A		0.3-4
ALH 84255	11.3	LL-6 CHONDRITE	A	A	28	24
ALH 84262	15.3	H-6 CHONDRITE	C	B	17	15
ALH 84264	137.6	L-6 CHONDRITE	A	A	24	21
EET 84301	75.1	L-6 CHONDRITE	B	B	24	20
EET 84302	59.6	ACHONDRITE	B/C	B	5	8
EET 84303	57.5	H-5 CHONDRITE	C	A	18	16
EET 84304	152.2	L-6 CHONDRITE	B	A	24	20
EET 84305	9.8	LL-6 CHONDRITE	A/B	B	27	22
EET 84306	3.5	H-6 CHONDRITE	C	A/B	19	16
EET 84307	5.1	L-6 CHONDRITE	C	A	23	20
EET 84308	9.3	L-6 CHONDRITE	B	A	24	20
ALH 85001	212.3	EUCRITE	A/B	A/B		32
ALH 85002	437.7	CARBONACEOUS C4	A	A	30	26
ALH 85005	18.9	CARBONACEOUS C2	A	A	0.5-39	.9-2.2
ALH 85006	49.0	CARBONACEOUS C3V	A	A	0.3-43	.9-4.9
ALH 85007	82.0	CARBONACEOUS C2	B	B	0.3-30	
ALH 85008	32.1	CARBONACEOUS C2	B	A/B	0.3-45	.9-2.5
ALH 85009	46.6	CARBONACEOUS C2	A	B	0.4-59	.8-1.6
ALH 85013	130.4	CARBONACEOUS C2	A	A/B	0.5-36	
ALH 85014	75.0	L-6 CHONDRITE	A	A	25	21
ALH 85015	3.2	DIOGENITE	A	A	39	25

Table 1. (cont.)

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
DOM 85500	59.8	H-5 CHONDRITE	B	A/B	18	16
GRO 85200	3821.6	H-5 CHONDRITE	B/C	A	18	16
GRO 85202	27.2	CARBONACEOUS C2	A/B	C	.8-1.2	
LEW 85300	210.3	EUCRITE	A/B	A		32-63
LEW 85302	114.5	EUCRITE	A/B	A/B		24-59
LEW 85303	408.0	EUCRITE	A/B	A		30-62
LEW 85305	40.8	EUCRITE	A	A		31-57
LEW 85306	6.5	CARBONACEOUS C2	A	A	0.2-33	.7-5.5
LEW 85309	54.1	CARBONACEOUS C2	A/B	B/C	0.2-41	.9-1.5
LEW 85311	199.5	CARBONACEOUS C2	B	B/C	0.4-36	.9-1.1
LEW 85312	31.7	CARBONACEOUS C2	B	B/C	0.2-45	.7-1.8
LEW 85313	191.2	DIOGENITE	B	B		28-35
LEW 85317	8.7	L-4 CHONDRITE	A/B	A	25	18-22
LEW 85320	110224.0	H-5 CHONDRITE	B	B	19	16

Table 2.

Newly Classified Specimens Listed By Type **

Achondrites

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
EET 84302	59.6	ACHONDRITE	B/C	B	5	8
ALH 85015	3.2	DIOGENITE	A	A	39	25
LEW 85313	191.2	DIOGENITE	B	B		28-35
ALH 85001	212.3	EUCRITE	A/B	A/B		32
LEW 85300	210.3	EUCRITE	A/B	A		32-63
LEW 85302	114.5	EUCRITE	A/B	A/B		24-59
LEW 85303	408.0	EUCRITE	A/B	A		30-62
LEW 85305	40.8	EUCRITE	A	A		31-57
ALH 84136	83.5	UREILITE	B	A/B	0-5	4

Carbonaceous Chondrites

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
ALH 84191	14.0	CARBONACEOUS C2	A	B	0.4-.8	0.8-7
ALH 85005	18.9	CARBONACEOUS C2	A	A	0.5-39	.9-2.2
ALH 85007	82.0	CARBONACEOUS C2	B	B	0.3-30	
ALH 85008	32.1	CARBONACEOUS C2	B	A/B	0.3-45	.9-2.5
ALH 85009	46.6	CARBONACEOUS C2	A	B	0.4-59	.8-1.6
ALH 85013	130.4	CARBONACEOUS C2	A	A/B	0.5-36	
GRO 85202	27.2	CARBONACEOUS C2	A/B	C	.8-1.2	
LEW 85306	6.5	CARBONACEOUS C2	A	A	0.2-33	.7-5.5
LEW 85309	54.1	CARBONACEOUS C2	A/B	B/C	0.2-41	.9-1.5
LEW 85311	199.5	CARBONACEOUS C2	B	B/C	0.4-36	.9-1.1
LEW 85312	31.7	CARBONACEOUS C2	B	B/C	0.2-45	.7-1.8
ALH 85006	49.0	CARBONACEOUS C3V	A	A	0.3-43	.9-4.9
ALH 84096	293.6	CARBONACEOUS C4	A/B	A	30	22
ALH 85002	437.7	CARBONACEOUS C4	A	A	30	26

Chondrites - Type 3

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
ALH 84086	234.0	LL-3 CHONDRITE	A/B	A	25-29	17-26
ALH 84126	41.2	LL-3 CHONDRITE	B	B	7-31	3-24

Table 2 (cont.).

Chondrites - Type 4

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
ALH 84084	331.8	H-4 CHONDRITE	B	A	18	16
ALH 84230	2.4	H-4 CHONDRITE	B	A	18	14-19
LEW 85317	8.7	L-4 CHONDRITE	A/B	A	25	18-22

E Chondrites

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
ALH 84170	39.2	E-3 CHONDRITE	B	A	0.6-28	0.9-17
ALH 84188	3.1	E-4 CHONDRITE	C	B		0.7-3
ALH 84206	15.1	E-4 CHONDRITE	A/B	A		0.7-6
ALH 84250	10.0	E-4 CHONDRITE	B	A		0.5-4
ALH 84254	2.0	E-4 CHONDRITE	B	A		0.3-4

** NOTES TO TABLES 1 and 2:

"Weathering" categories:

- A: Minor rustiness; rust haloes on metal particles and rust stains along fractures are minor.
- B: Moderate rustiness; large rust haloes occur on metal particles and rust stains on internal fractures are extensive.
- C: Severe rustiness; metal particles have been mostly stained by rust throughout.

"Fracturing" categories:

- A: Minor cracks; few or no cracks are conspicuous to the naked eye and no cracks penetrate the entire specimen.
- B: Moderate cracks; several cracks extend across exterior surfaces and the specimen can be readily broken along the cracks.
- C: Severe cracks; specimen readily crumbles along cracks that are both extensive and abundant.

TABLE 3.

List of Newly Announced Meteorites that may be Paired.

Ureilite:
ALH84136 with ALH82106, 82130.

Carbonaceous C2:
ALH84191 with ALH84033.

ALH85005, 85007, 85008, 85009, 85013.

LEW85306, 85309, 85311, 85313.

E-4 Chondrite:
ALH84188, 84206, 84250, 84254 with ALHA81189, 82132.

Sample No.: ALH84086
Weight (g): 234.0
Dimensions (cm): 9 x 5 x 3.5
Meteorite Type: LL3 Chondrite

Location: Allan Hills
Field No.: 1569

Macroscopic Description: Roberta Score
Fusion crust covers most of this chondrite. Abundant inclusions, both chondrules and clasts, are contained in the medium gray-colored matrix. One light-colored clast visible on the exterior is 0.7 x 0.9 cm in dimension. Oxidation is minor.

Thin Section (,3) Description: Brian Mason
The section shows a close-packed aggregate of chondrules, chondrule fragments, and irregular inclusions up to 3 mm across, with a few grains of nickel-iron and sulfide and hardly any matrix. A considerable variety of chondrules is present, the commonest being porphyritic olivine and granular olivine with or without polysynthetically twinned clinopyroxene. Some chondrules have intergranular, transparent pale brown glass; in others the glass is turbid and partly devitrified. Microprobe analyses show a moderate range in the composition of olivine (Fa 25-29), and a wider range in pyroxene (Fs 17-26). This range in composition, and the presence of glass and twinned clinopyroxene, indicates type 3, and the olivine composition is characteristic of the LL group; the meteorite is therefore classified as an LL3 chondrite.

Sample No.: ALH84096
Weight (g): 293.6
Dimensions (cm): 10 x 5 x 4
Meteorite Type: C4 Chondrite

Location: Allan Hills
Field No.: 2515

Macroscopic Description: Carol Schwarz
Thin fusion crust covers 70% of this specimen. Areas devoid of fusion crust are mostly weathered and have a rough texture. Fresher areas are gray in color with some darker gray clasts, white clasts, and metal. The interior is medium gray and has several darker gray clasts. Chipping exposed a metal-rich area of several mm^2.

Thin Section (,4) Description: Brian Mason
The section has a brecciated appearance, with angular areas up to 5 mm across differing in color from pale gray to dark brown; however, the grain size is fairly uniform throughout. The meteorite appears to consist largely of fine-grained olivine (grain size 0.01-0.1 mm) with a small amount (2-3%) of nickel-iron and sulfide. Chondritic structure is barely perceptible. Microprobe analyses gave the following compositions: olivine, Fa 30; pyroxene, Fs 22; plagioclase, An 10. The meteorite is tentatively classified as a C4 chondrite.

Sample No.: ALH84126
Weight (g): 41.2
Dimensions (cm): 3.5 x 3.5 x 2
Meteorite Type: LL3 Chondrite

Location: Allan Hills
Field No.: 2006

Macroscopic Description: Roberta Score
This fragment retains four small patches of fusion crust. The overall exterior color is brown. Numerous chondrule/inclusions show relief on the surface, giving the exterior a rough texture. Weathering has extended deep into the interior. The less weathered material is medium gray with abundant rounded and irregular shaped inclusions.

Thin Section (,2) Description: Brian Mason
The section shows a close-packed aggregate of chondrules, chondrule fragments, and angular clasts, ranging up to 3 mm across. Many of the chondrules have dark rims. A variety of chondrule types is present, including porphyritic olivine, granular olivine and olivine-pyroxene, and radiating pyroxene. A few grains of nickel-iron and troilite are present. Olivine and pyroxene have variable compositions. Olivine composition ranges Fa 7-31 with a mean of Fa 16 (% mean deviation of FeO is 46). Pyroxene composition ranges Fs 3-24, with a mean of Fs 9 (% mean deviation of FeO is 45). The texture and variable mineral compositions are those of type 3, and the amount of metal suggests LL group, hence the meteorite is tentatively classified as an LL3 chondrite.

Sample No.: ALH84100
Weight (g): 110.3
Dimensions (cm): 7.5 x 3.5 x 3
Meteorite Type: H5 Chondrite with clast

Location: Allan Hills
Field No.: 2800

Macroscopic Description: Roberta Score
Weathered fusion crust covers 60% of this fragment. One striking feature of this stone is the heavily weathered fracture surface which contains a semi-rounded clast, 1.5 x 1.3 x 0.2 cm in dimension. This clast is white to light gray in color and coarse-grained. The interior is moderately weathered (heavy in areas), medium-gray in color, and contains numerous chondrules.

Thin Section (,4; ,5) Description: Brian Mason
Portions of the clast in this H5 chondrite are present in two thin sections (84100,4 from 84100,1 and 84100,5 from 84100,2). The clast consists of granular olivine and pyroxene, with a little plagioclase and trace amounts of nickel-iron. Compositions of olivine (Fa 18) and pyroxene (Fs 16) are similar to those in the chondritic part of the meteorite; in addition, one grain of pigeonite (Wo 9 Fs 15) was analysed. Two grains of plagioclase (An 38, 50) were analysed. The olivine is turbid and shows undulose extinction (possible shock effects).

Sample No.: ALH84136
Weight (g): 83.5
Dimensions (cm): 6.5 x 3 x 3.5
Meteorite Type: Ureilite

Location: Allan Hills
Field No.: 1527

Macroscopic Description: Rene' Martinez
Flaky black fusion crust entirely covers this specimen. The interior is dark gray and granular with crystals as large as 2 mm in a red-brown matrix. Stone is very coherent.

Thin Section (,3) Description: Brian Mason
The section shows an aggregate of anhedral to subhedral grains (0.6-2.4 mm across) of olivine and pyroxene, with about 10% of opaque material, in part disseminated throughout and in part concentrated along grain boundaries. Olivine grains are gray from submicroscopic opaque inclusions, whereas pyroxene grains are clear but are extremely fractured. Well-preserved fusion crust is present on one edge. Microprobe analyses give the following compositions: olivine, somewhat variable, Fa 0-5, mean Fa 3; pyroxene, essentially uniform, Wo 5 Fs 4; one grain of endiopside, Wo 34 Fs 2.5, was analysed. The mineralogy and texture are typical of a ureilite; this specimen is so similar in all respects to ALH82106 and 82130 that it can be confidently paired with them.

Sample No.: ALH84170
Weight (g): 39.2
Dimensions (cm): 3.5 x 3 x 2
Meteorite Type: E3 Chondrite

Location: Allan Hills
Field No.: 2535

Macroscopic Description: Roberta Score
Fifty percent of this fragment is covered by extremely weathered brown fusion crust. The exposed interior has a black matrix with numerous white to gray rounded and irregular-shaped inclusions. ALH84170 is a coherent specimen.

Thin Section (,2) Description: Brian Mason
Chondrules are abundant, ranging from 0.3-2.0 mm across; they consist of radiating or granular pyroxene, some with olivine. The matrix is made up of chondrule fragments and mineral grains, with a considerable amount of opaque materials (nickel-iron and sulfides). Weathering is extensive, with brown limonitic staining throughout the section. Microprobe analyses show many grains of olivine and pyroxene close to Mg_2SiO_4 and $MgSiO_3$ in composition, but some contain a considerable amount of iron. The nickel-iron contains 2.2-3.0% Si. The meteorite is an enstatite chondrite, and the unequilibrated compositions of the olivine and pyroxene suggest the E3 classification.

Sample No.: ALH84191
Weight (g): 14.0
Dimensions (cm): 3 x 2.5 x 1
Meteorite Type: C2 Chondrite

Location: Allan Hills
Field No.: 1451

Macroscopic Description: Roberta Score
A fractured, blistered, black fusion crust entirely covers ALH84191. Chipping revealed an interior that is black with many rounded and irregular shaped inclusions. Oxidation is minor.

Thin Section (,2) Description: Brian Mason
The section shows scattered chondrules (up to 0.6 mm across), irregular aggregates, and mineral grains in a black matrix which contains dispersed metal and sulfide grains. There is little or no evidence of terrestrial weathering. Microprobe analyses show olivine as nearly pure Mg_2SiO_4 (FeO 0.4-1.3%) and pyroxene with somewhat greater variation (FeO 0.6-4.5%; CaO 0.4-2.2%). The meteorite is a C2 chondrite, and closely resembles ALH84033 and other meteorites paired with it.

Sample Nos.: ALH84188, 84206, 84250, 84254
Weight (g): 3.1; 15.1; 10.0; 2.0
Dimensions (cm): 1x2x0.7; 2x2x1; 2x2x1; 1.5x1.5x0.4
Meteorite Type: E4 Chondrite

Location: Allan Hills
Field Nos.: 2837; 2686; 2813; 1544

Macroscopic Description: Roberta Score
All four specimens retain some fusion crust (84254 is totally covered with fusion crust). The interiors of 84206 and 84250 are black with inclusions as large as 2 mm in diameter, while the interiors of 84188 and 84254 are black and have a massive texture. Metal is present in 84206 and 84254. 84188 is extensively weathered; the others are minimally to moderately weathered.

Thin Section (ALH84188,2) Description: Brian Mason
Chondrules are relatively abundant, but are small, usually about 0.6 mm in diameter; they consist of fine-grained to coarsely granular pyroxene. The matrix consists largely of chondrule fragments and pyroxene grains, with a moderate amount of nickel-iron and sulfides. The meteorite is considerably weathered, with brown limonitic staining throughout the section. Microprobe analyses show that most of the pyroxene is almost pure $MgSiO_3$, but a few grains show FeO up to 2.7%. The nickel-iron contains 2.5% Si. The meteorite is an enstatite chondrite, and since some of the pyroxene is polysynthetically twinned clinoenstatite, it is classed E4. It closely resembles ALH81189, 82132, 84206, 84250, and 84254, and the possibility of pairing should be considered.

Sample No.: ALH85001
Weight (g): 212.3
Dimensions (cm): 7 x 6 x 3.5
Meteorite Type: Eucrite

Location: Allan Hills
Field No.: 2255

Macroscopic Description: Roberta Score

ALH85001 appears to be an oriented stone covered by a shiny black fusion crust with thick flow lines. Areas devoid of fusion crust have weathered to a brownish-gray color. A discontinuous weathering rind, as thick as 4 mm, was exposed when the stone was chipped. The interior is made up of abundant laths of chalky-looking plagioclase in a light gray matrix. The way this stone has weathered is more typical of the Elephant Moraine eucrites than those found in the Allan Hills.

Thin Section (,4) Description: Brian Mason

The section shows angular fragments of orthopyroxene and plagioclase, up to 2.4 mm across, in a comminuted groundmass of these minerals. Some of the pyroxene has lamellae and blebs of exsolved augite. One large gabbroic clast, 6 mm across with individual grains up to 3 mm, is present. Trace amounts of nickel-iron and troilite are present in the groundmass. Microprobe analyses show that pyroxene compositions are remarkable uniform, Wo 2 Fs 32, with a few more calcic grains, up to Wo 8 (possibly incipient augite exsolution). Plagioclase composition is also fairly uniform, An 92-94. The meteorite is a monomict eucrite with unusually magnesian pyroxene, similar to that in the Binda eucrite.

Sample No.: ALH85002
Weight (g): 437.7
Dimensions (cm): 8 x 7 x 5
Meteorite Type: C4 Chondrite

Location: Allan Hills
Field No.: 2219

Macroscopic Description: Rene' Martinez

Approximately 80% of the exterior is covered with reddish-brown, polygonally fractured fusion crust. The interior is light gray with dark rounded inclusions as large as 1 mm and white irregular-shaped inclusions as large as 3 mm in longest dimension.

Thin Section (,4) Description: Brian Mason

The section consists largely of finely granular olivine (grains ranging up to 0.1 mm), with a little pyroxene, plagioclase, and opaques (largely magnetite). A few chondrules, made up of coarser-grained olivine, are present. The section is rimmed with fusion crust along one edge. Microprobe analyses give the following compositions: olivine, Fa 29; pyroxene, Fs 26; plagioclase, An 54-59. The meteorite is a C4 chondrite and closely resembles ALH82135; the possibility of pairing should be considered.

Sample No.: ALH85005, 85007, 85008, 85009, 85013
Weight (g): 18.9; 82.0; 32.1; 46.6; 130.4
Dimensions (cm): 4x2x3; 5x4x4; 3x3x3.5; 4.5x3x3; 6x5x3.5
Meteorite Type: C2 Chondrite

Location: Allan Hills
Field Nos.: 2268; 2209; 2284; 2240; 2257

Macroscopic Description: Rene' Martinez
ALH85013 is completely covered with fusion crust; ALH85005 and 85009 retain some weathered fusion crust. The others have no fusion crust and have a knobby appearance with inclusions protruding from the surface. The interiors appear relatively unweathered, black, fine-grained, and contain irregular white inclusions that are <0.5 mm in longest dimension.

Thin Section (ALH85005,4) Description: Brian Mason
The section consists largely of black opaque matrix, through which are scattered small mineral grains (up to 0.2 mm) and sparse chondrules and chondrule fragments. The chondrules and most of the mineral grains consist of olivine, usually close to Mg_2SiO_4 in composition but with some more iron-rich. Pyroxene is less common, and is close to $MgSiO_3$ in composition. A few grains of calcite were noted. The meteorite is a C2 chondrite; ALH85007, 85008, 85009, and 85013 are very similar and the possibility of pairing should be considered.

Sample No.: ALH85006
Weight (g): 49.0
Dimensions (cm): 4 x 3 x 3
Meteorite Type: C3V Chondrite

Location: Allan Hills
Field No.: 2660

Macroscopic Description: Rene' Martinez
Fusion crust is present on only one surface of this coherent stone. The interior is made up of chondrules, up to 2 mm in diameter, and irregular white inclusions, up to 3 mm in longest dimension.

Thin Section (,5) Description: Brian Mason
The section shows a variety of chondrules (up to 2.5 mm across), chondrule fragments, and irregular clasts in a dark brown to black matrix. Fine-grained opaques are dispersed throughout the matrix and rim some of the chondrules. The matrix consists largely of fine-grained iron-rich (Fa 45-47) olivine. Olivine in the chondrules and mineral fragments is usually near Mg_2SiO_4 in composition, but more iron-rich grains are also present. Pyroxene is much less abundant than olivine, and is close to $MgSiO_3$ in composition. The meteorite is a C3 chondrite of the Vigarano subtype.

Sample No.: ALH85015
Weight (g): 3.2
Dimensions (cm): 1 x 1 x 1
Meteorite Type: Diogenite

Location: Allan Hills
Field No.: 2281

Macroscopic Description: Roberta Score
Fifty percent of ALH85015 is covered with black fusion crust that is shiny in some areas and dull in other areas. Part of the area devoid of fusion crust is highly polished. A weathering rind extends 2 mm into the interior of the stone. The interior is medium gray in color with white and dark colored clasts.

Thin Section (,2) Description: Brian Mason
The section consists almost entirely of orthopyroxene clasts, up to 3 mm across, in a groundmass of comminuted orthopyroxene, with accessory plagioclase and opaques, and traces of olivine. The pyroxene is fairly uniform in composition, Fs 25, with CaO 0.8-1.5%, MnO 0.45-0.67%, Al_2O_3 0.32-0.66%, TiO_2 0.05-0.17%. Plagioclase composition is An 84-95. One grain of olivine, Fa 39, was analysed. The meteorite is a diogenite.

Sample No.: EET84302
Weight (g): 59.6
Dimensions (cm): 4 x 3 x 2.5 cm
Meteorite Type: Achondrite

Location: Elephant Moraine
Field No.: 2195

Macroscopic Description: Roberta Score
The exterior of this stone is mostly covered with thin fusion crust. Medium-grained pyroxene, plagioclase and some scattered metal comprise the heavily oxidized interior of EET84302.

Thin Section (,3) Description: Brian Mason
The section shows an anhedral granular aggregate (grain size 0.1-0.4 mm), consisting largely of olivine and orthopyroxene, with minor amounts of plagioclase, diopside, nickel-iron, and troilite. Weathering is extensive, with limonitic staining throughout the section. Microprobe analyses gave the following compositions: olivine, Fa 5; orthopyroxene, Wo 2 Fs 8; diopside, Wo 42 Fs 3; plagioclase, An 23. Texturally this meteorite is an achondrite. However, it resembles a silicate inclusion from an iron meteorite; inclusions with similar texture and mineral compositions have been described from several iron meteorites.

Sample No.: GRO85202
Weight (g): 27.2
Dimensions (cm): 4 x 3.5 x 3.5
Meteorite Type: C2 Chondrite

Location: Grosvenor Mountains
Field No.: 2053

Macroscopic Description: Rene' Martinez
Thin fractured fusion crust covers two sides of this carbonaceous chondrite. Fusion crust appeared to be the only thing holding the sample together as it was highly fractured and disintegrated when the stone was chipped. The interior is fine-grained with no inclusions visible. Minute evaporite deposit lines some of the interior fractures.

Thin Section (,4) Description: Brian Mason
The section shows a dark brown to black matrix with numerous mineral grains and aggregates and rare small chondrules. Most of the mineral grains and aggregates consist of an isotropic to weakly birefringent serpentine-like mineral. A few grains of olivine near Mg_2SiO_4 in composition were analysed; some grains of calcite were noted. The meteorite is a C2 chondrite.

Sample No.: LEW85300, 85302, 85303
Weight (g): 210.3; 114.5; 408.0
Dimensions (cm): 7x6.5x3.5; 5.5x5x3; 8.5x6x5.5
Meteorite Type: Eucrite

Location: Lewis Cliff
Field Nos.: 2474; 2422; 2488

Macroscopic Description: Roberta Score
Thin, shiny fusion crust with flow marks coats most of the top of LEW85300. The bottom surface has some fusion crust but most of this face is a fracture surface which appears to have been moderately polished. Fusion crust appears as dull patches on 85302 and 85303. Several large semi-rounded polymineralic clasts (as large as 2 x 2 cm in dimension) have sharply defined edges and are set in a black matrix that is made up of minute inclusions.

Cleaving the stones in half revealed an interior that is lighter in color than the exterior. Several different sharply defined clasts, including white, fine-grained clasts and black aphanitic clasts, were exposed. One large interior area shows extensive oxidation.

Thin Section (LEW85300,12; ,13; ,14) Description: James L. Gooding and Brian Mason

,12: A large (6 mm apparent maximum dimension) light-colored clast is enclosed by finer-grained dark matrix. Clast is composed of subhedral clinopyroxene and plagioclase (typical grain size is a few tenths mm) in a groundmass of granular pyroxene. Both clinopyroxene and plagioclase are cloudy and show crenulated and undulatory extinction under crossed polars. Some clinopyroxene crystals show very fine herringbone texture (probably exsolution lamellae). Ilmenite (?) is abundant in the clast and occurs as irregular grains of ~0.01-0.2 mm size. Matrix surrounding clast is a porous, clastic aggregate of pyroxene and plagioclase mineral fragments with characteristic grain sizes of ~0.1-0.2 mm, but with increasingly finer grains between the large grains. Other optical properties of pyroxene and plagioclase are similar to those described for the clast.

,13: Nearly all of exposed area is subophitic basalt that is comparable in grain size to the clast in ,12, but with much better preserved igneous texture. Clinopyroxene has pronounced herringbone texture (more abundant than in ,12) and ilmenite (?) is an accessory phase.

,14: At least two large clasts (~4-5 mm) of subophitic basalt (with ilmenite (?)) float in a finer-grained clastic matrix, as in ,12. At least two irregular grains of Ni-Fe metal (one ~0.015 mm, the other ~0.12 mm) occur, with the larger one being in the matrix and the smaller one in a clast. The most interesting feature of this section is a dark clast (~2-3 mm size) that resembles a fragment of carbonaceous chondrite (possibly C3). Most of this clast consists of an opaque matrix of low reflectivity (resembles reflectivity of magnetite) with a floating framework of cloudy, irregular, polymineralic clasts and isolated single-crystal mineral fragments. Some of the clasts are nearly spherical but resemble "inclusions" more than "chondrules"; olivine might exist in some of them. Both the border of this clast and objects within it are defined by haloes of dispersed, very fine-grained sulfides. One small grain of possible Ni-Fe metal was observed.

Microprobe analyses of the LEW85300,14 section (by B. Mason) show pyroxene compositions clustering around Wo 3 Fs 60 and ranging to Wo 43 Fs 26, with the mean of 15 analyses Wo 12 Fs 52; two grains with composition Wo 3 Fs 33 were found. Plagioclase ranges in composition An 84-93 with a mean of An 89. The dark clast is a fragment of a C3 carbonaceous chondrite, consisting largely of fine-grained olivine, ranging in composition Fa 1-44; one grain of clinoenstatite (Fs 5) and one of spinel (FeO 0.8%) were analysed. The meteorite is a eucrite with a C3 clast.

Sample No.: LEW85305
Weight (g): 40.8
Dimensions (cm): 3 x 3 x 1.5
Meteorite Type: Eucrite

Location: Lewis Cliff
Field No.: 2002

Macroscopic Description: Roberta Score
LEW85305 has a retangular shape and is completely covered with shiny fusion crust. Flow marks are apparent in the fusion crust. The interior has a granular texture, plagioclase is evenly disseminated throughout the brownish matrix.

Thin Section (,4) Description: Brian Mason
The section shows a granular aggregate of pale brown pyroxene and colorless pyroxene, with accessory opaques; a small amount of an SiO_2 polymorph, probably tridymite, is present. The meteorite is unbrecciated, but the pyroxene grains (and to a lesser extent the plagioclase) are considerably granulated. Microprobe analyses show pyroxene compositions ranging almost continuously from Wo 6 Fs 57 to Wo 37 Fs 31, with fairly uniform En content. Plagioclase composition is An 84-88. The meteorite is an eucrite; it resembles Ibitira in texture and mineral compositions.

Sample No.: LEW85306, 85309, 85311, 85312
Weight (g): 6.5; 54.1; 199.5; 31.7
Dimensions (cm): 2.5x2.5x1.5; 6x3.5x3; 6x5x5 and 5x2x3; 4.5x3x3
Meteorite Type: C2 Chondrite

Location: Lewis Cliff
Field Nos.: 2001; 2047; 3103; 3108

Macroscopic Description: Rene' Martinez
Frothy black fusion crust appears as patches on these stones. The interiors of these fragments have abundant light-colored clasts/chondrules that are set in a black fine-grained matrix. Thin evaporite deposit is present on 85309. Some brownish-red oxidation was noted.

Thin Section (LEW85306,3) Description: Brian Mason
The section shows numerous mineral grains and aggregates and a few small (maximum diameter 0.6 mm) chondrules in a brown to black matrix. Most of the mineral grains are olivine, usually near Mg_2SiO_4 in composition, but some are more iron-rich. Pyroxene is less abundant, and is near $MgSiO_3$ in composition. The meteorite is a C2 chondrite.

LEW85309, 85311, and 85312 are very similar to LEW85306 in texture and mineral compositions, and the possibility of pairing should be considered.

Sample No.: LEW85313
Weight (g): 191.2
Dimensions (cm): 8 x 5.5 x 4.5
Meteorite Type: Diogenite

Location: Lewis Cliff
Field No.: 2498

Macroscopic Description: Roberta Score
Dull fusion crust covers most of LEW85313 except where large pieces of stone have been plucked out. This feature is abundant and makes this meteorite resemble a piece of Swiss cheese.

A brownish-gray weathering rind extends from less than 1 mm to greater than 1 cm into the interior. The massive gray matrix contains both rounded and irregular inclusions that range in color from white to black. Some oxidation haloes are obvious.

Thin Section (,5) Description: Brian Mason
The section shows orthopyroxene clasts, up to 4 mm across, in a matrix consisting largely of comminuted pyroxene with a small amount of plagioclase. The orthopyroxene clasts show a minor amount of augite exsolution, both blebby and lamellar. Most of the pyroxene has uniform composition, Fs 29, but a few more iron-rich grains were analysed; minor consitituents are CaO 0.53-2.7%, MnO 0.64-0.80%, Al_2O_3 0.24-0.91%, TiO_2 0.16-0.31%. One grain of diopside, Wo 44 Fs 12, was analysed. Plagio- clase composition is An 88-91. Accessory amounts of an SiO_2 polymorph, probably tridymite, were identified. The meteorite is a diogenite.

Sample No.: LEW85320
Weight (g): ~110224
Dimensions (cm): 61 x 48 x 27
Meteorite Type: H5 Chondrite

Location: Lewis Cliff
Field No.: 3164

Macroscopic Description: Roberta Score
Dull thin black fusion crust with abundant oxidation haloes covers this entire oriented specimen. Shallow regmaglypts are present on each surface except for the bottom. Some regmaglypts contained Antarctic soil. This was collected and given split number 2. LEW85320 is moderately fractured and many of these fractures are lined with crusty and powdery evaporite deposit. Seven hundred milligrams was scraped from the surface and given split number 3. A chip for classification purposes was taken from an inconspicuous area and yielded a highly weathered sample. This most likely is not representative of the weathering or condition of the interior of the entire stone.

Thin Section (,4) Description: James L. Gooding and Brian Mason
This section, which represents the outer 1.5 cm of the specimen, displays ordinary chondritic texture with brecciation. The ferromagnesian chondrule population includes all of the common textural types and most chondrules are readily distinguished from the matrix. However, chondrule pyroxenes are not dominantly monoclinic and chondrule mesostases are mostly cryptocrystalline and birefringent. In addition, there were few, if any, signs of primitive rims on chondrules and the chondrite matrix was mostly a translucent to transparent, granular assemblage of olivine and pyroxene.

Brecciation in this particular sample is most conspicuously displayed as a light/dark contrast between the outer (toward fusion crust) and inner halves of the section. The dark area appears to be enriched in fine-grained matrix (possibly including an enrichment in sulfides) relative to the light area. Although the section is stained with Fe-oxide weathering products of Antarctic origin, the light/dark contrast is probably a feature of pre-terrestrial origin.

A preliminary modal analysis (230 points) of the total section gave 85 vol. % silicates, 11% Ni-Fe metal, and 4% sulfides. Electron microprobe analyses (by B. Mason) showed nearly homogeneous olivine (Fa 19) and pyroxene (Fs 16). On the basis of texture and composition, the specimen is classified as an H5 chondrite.

TABLE 4.

Homogenized Powders of Antarctic Meteorites

a) Original weight of the sample in grams
b) Remaining powder after distribution (as of August 1986)

Meteorite	Amount	Type #	Meteorite	Amount	Type #
a) ALHA76004,10	2.015	LL3	a) ALHA77260,17	3.100	L3 *
b)	0.162		b)	0.504	
a) ALHA77003,20	4.700	C30 *	a) ALHA77270,18	20.060	L6
b)	0.987		b)	11.988	
a) ALHA77005,38	2.310	Sh *	a) ALHA77271,20	20.230	H6
b)	0.158		b)	12.000	
a) ALHA77011,11	3.360	L3 *	a) ALHA77278,23	5.152	LL3 *
b)	0.577		b)	1.047	
a) ALHA77015,17	3.110	L3 *	a) ALHA77284,12	21.130	L6
b)	0.280		b)	13.263	
a) ALHA77155,12	20.190	L6	a) ALHA77294,26	20.040	H5
b)	11.763		b)	12.531	
a) ALHA77167,19	3.100	L3 *	a) ALHA77296,12	20.850	L6
b)	0.519		b)	13.750	
a) ALHA77214,18	10.700	L3 *	a) ALHA77297,23	20.200	L6
b)	4.508		b)	12.994	
a) ALHA77216	19.770	L3 $	a) ALHA77299,17	5.122	H3 *
b)	10.845		b)	1.340	
a) ALHA77219,27	2.000	Me	a) ALHA77304,23	3.520	L4 *
b)	0.110		b)	0.785	
a) ALHA77231,25	20.080	L6	a) ALHA77307,55	3.513	C3
b)	11.910		b)	1.420	
a) ALHA77249,16	3.000	L3 *	a) ALHA78078,09	20.060	L6
b)	0.225		b)	12.741	
a) ALHA77256,33	2.210	Di *	a) ALHA78106,23	20.150	L6
b)	0.362		b)	13.177	
a) ALHA77256,96	20.560	Di	a) ALHA80102,68	4.350	Eu
b)	20.403		b)	2.072	
a) ALHA77257,44	2.210	Ur *	a) ALHA81001,12	2.001	Eu
b)	0.224		b)	1.140	

Table 4 (continued).

	Meteorite	Amount	Type #		Meteorite	Amount	Type #
a)	ALHA81006,22	4.010	Eu	a)	EETA79004,76	4.090	Eu
b)		1.645		b)		1.605	
a)	ALHA81007,09	2.002	Eu	a)	EETA79005,69	4.075	Eu
b)		1.348		b)		1.661	
a)	ALHA81009,27	4.059	Eu	a)	EETA79011,33	2.099	Eu
b)		1.609		b)		1.169	
a)	ALHA81010,18	4.040	Eu	a)	EET 82600,13	4.092	Ho
b)		1.915		b)		1.929	
a)	ALHA81011	4.195	Eu $	a)	EET 83213,38	20.640	L3
b)		1.860		b)		20.508	
a)	ALHA81027,17	10.260	L6	a)	EET 83232,05	10.030	Eu
b)		8.003		b)		9.773	
a)	ALH 82101,16	2.530	C30	a)	PCA 82502,32	4.128	Eu
b)		0.372		b)		1.747	
a)	ALH 83100,74	20.227	C2	a)	PCA 82506,07	20.096	Ur
b)		17.924		b)		17.501	
a)	ALH 83102,45	20.011	C2	a)	PCA 82507,05	20.200	LL6
b)		19.785		b)		18.067	
a)	ALH 84007,32	8.400	Au	a)	RKPA80256,07	3.010	L3
b)		7.591		b)		1.153	
a)	EETA79001	15.236	Sh $	a)	TIL 82402,05	20.300	LL6
b)		5.888	lith A	b)		18.319	
a)	EETA79001	9.437	Sh $	a)	TIL 82403,15	2.000	Eu
b)		3.554	lith B	b)		1.196	

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Au = aubrite, Di = diogenite, Eu = eucrite, Ho = Howardite, Sh = shergottite, Ur = ureilite; others are chondrites

$ ALHA77216 is a pool of samples ,7 ,10 ,26 and ,32.
ALHA81011 is a pool of samples ,28 ,30 and ,31.
EETA79001 lith A is a pool of samples ,23 ,24 and ,35.
EETA79001 lith B is a pool of samples ,37 and ,46.

All meteorites were prepared in a agate mortar, except for those marked with asterisk "*" which were prepared in a tungsten carbide mortar.